



**UNITED STATES DEPARTMENT OF COMMERCE**  
**Patent and Trademark Office**

Address : COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
---------------	-------------	----------------------	---------------------

07/655,857      02/15/91      TROUNSON

J 018420-001

**EXAMINER**

BROWN, T

ART UNIT	PAPER NUMBER
----------	--------------

23016

6

DATE MAILED:

11/5/92

BURNS, DOANE, SWECKER & MATHIS  
GEORGE MASON BLDG.  
WASHINGTON & PRINCE STS.  
P.O. BOX 1404  
ALEXANDRIA, VA 22313-1404

This is a communication from the examiner in charge of your application.  
COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined      ☒ Responsive to communication filed on 7-21-92      ☒ This action is made final.

A shortened statutory period for response to this action is set to expire 3 month(s), — days from the date of this letter. Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

**Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:**

1. ☐ Notice of References Cited by Examiner, PTO-892. 2. ☐ Notice re Patent Drawing, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449. 4. ☐ Notice of Informal Patent Application, Form PTO-152.
5. ☐ Information on How to Effect Drawing Changes, PTO-1474. 6. ☐

## Part II SUMMARY OF ACTION

1. ☒ Claims 1-4, 7-13, 15, and 18-23 are pending in the application.
- Of the above, claims \_\_\_\_\_ are withdrawn from consideration.
2. ☐ Claims \_\_\_\_\_ have been cancelled.
3. ☐ Claims \_\_\_\_\_ are allowed.
4. ☒ Claims 1-4, 7-13, 15, and 18-23 are rejected.
5. ☐ Claims \_\_\_\_\_ are objected to.
6. ☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.
8. ☐ Formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on \_\_\_\_\_. Under 37 C.F.R. 1.84 these drawings are ☐ acceptable. ☐ not acceptable (see explanation or Notice re Patent Drawing, PTO-948).
10. ☐ The proposed additional or substitute sheet(s) of drawings, filed on \_\_\_\_\_ has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed on \_\_\_\_\_, has been ☐ approved. ☐ disapproved (see explanation).
12. ☐ Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. \_\_\_\_\_; filed on \_\_\_\_\_.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other \_\_\_\_\_

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-4, 7-13, 15 and 18-23 are rejected under 35 U.S.C. § 103 as being unpatentable over Daggett et al. ('847) in view of Anderson ('653).

As per claims 1-4, Daggett discloses a feedback control loop for each joint motor including at least digital position, velocity and torque control loops operable at a predetermined sampling rate and means for generating digital motor position, velocity and drive current feedback signals for said control loop means for all of the robot axes. Daggett further discloses digital control for each axis using a pulse width modulation scheme. Thus, Daggett's disclosure differs from these claims by not using a single computational resource to control the multi-axis machine. Anderson discloses the concept of using a single computational resource, a micro-computer numeric control system, to provide a multi-axis motion control system. Anderson further discloses in column 1, "The basic concepts are primarily directed to the use of software to replace hardware conventionally used in this type of system." It would have been obvious to one of ordinary skill in the control art to replace the multi-computational source as disclosed by Daggett with the single-computational source as disclosed by Anderson for the purpose of replacing conventionally hardware circuits with more flexible software circuits.

As per claims 7-13, 15 and 18-23, Daggett discloses in columns 58-61, section "Trajectory Program", all the limitations set forth in these claims. In this section the curve to be followed is fitted with an appropriate polynomial and the coefficients of the polynomial are stored. The stored coefficients are then employed in equations that are used to produce smooth transition between different slew values in successive path segments.

3. Claims 1-4 are rejected under 35 U.S.C. § 103 as being unpatentable over Woodman et al ('603) in view of Anderson.

As per claims 1-4, Woodman discloses a controller for multiple-axis machine in figure 1, a plurality of motors 14, and a plurality of feedback devices (encoders 14). Woodman further discloses controlling the movement of a tool relative to a workpiece along each one of a plurality of axes by digitally providing a train of digital pulses to an actuator and by digitally modulating the pulse widths. Thus, Woodman differs from these claims by not using a single computational resource to control the multi-axis machine. Anderson discloses the concept of using a single computational resource, a micro-computer numeric control system, to provide a multi-axis motion control system. Anderson further discloses in column 1, "The basic concepts are primarily directed to the use of software to replace hardware conventionally used in this type of system." It would have been obvious to one of ordinary skill in the control art to

Serial No. 07/655,857  
Art Unit 2306

-4-

replace the multi-computational source as disclosed by Woodman with the single-computational source as disclosed by Anderson for the purpose of replacing conventionally hardware circuits with more flexible software circuits.

4. Applicant's arguments filed 7-21-92 have been fully considered but they are not deemed to be persuasive.

Applicant's argument of neither Daggett nor Woodman using a single computational resource is overcome by combining each of these references with Anderson, who teaches the benefits of controlling using a single-computational resource as compared to multiple processors.

In response to applicant inquiry for the portion of the Woodman patent which is deemed to anticipate the subject matter recited in original claim 6; the concept of controlling the speed over a range by adjusting the pulse width is discussed throughout Woodman.

5. Applicant's amendment necessitated the new grounds of rejection. Accordingly, **THIS ACTION IS MADE FINAL**. See M.P.E.P. § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 C.F.R. § 1.136(a).

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO MONTHS OF THE MAILING DATE OF THIS FINAL ACTION AND THE ADVISORY ACTION IS NOT MAILED UNTIL AFTER THE END OF THE THREE-MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 C.F.R. § 1.136(a) WILL BE CALCULATED FROM THE

Serial No. 07/655,857  
Art Unit 2306

-5-

MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Brown whose telephone number is (703) 308-0785.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0754.

Tom Brown *TS*  
October 10, 1992

*Jerry Smith*  
JERRY SMITH  
SUPERVISORY PATENT EXAMINER  
ART UNIT 236